PROJECT PROFILE

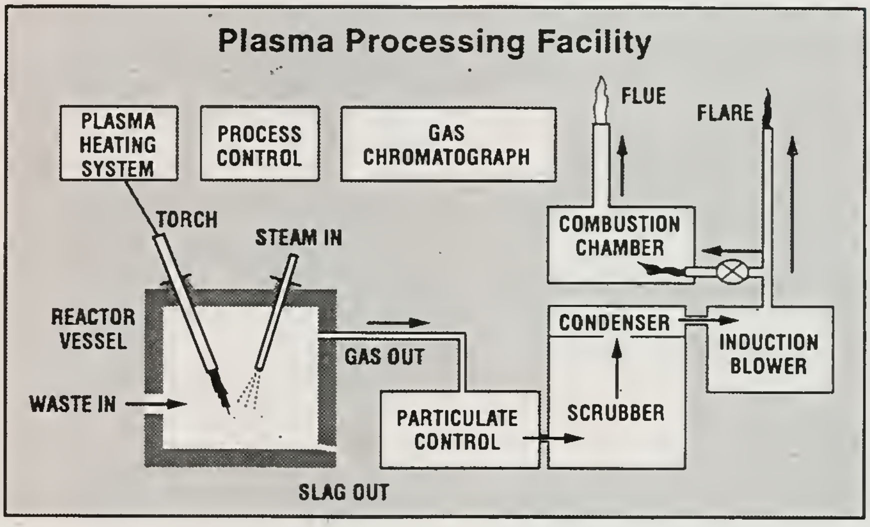
TECHNOLOGY APPLICATION

Ontario

Plasma Gasification Feasibility Study of Biomedical Waste

> *“The RCL founders envisaged a new generation solution for the disposal of all waste streams based on the intense and versatile heat capabilities of plasma technology. Results achieved through years of dedicated research and development have confirmed the validity of this vision and strengthened RCL's drive to advance plasma technology into the marketplace for environmentally friendly waste disposal. We remain committed to the achievement of this objective.”*

G.W. Carter
President
Resorption Canada Limited
Gloucester, Ontario



Plasma Processing Facility

THE COMPANY

Resorption Canada Limited (RCL) is a private Canadian high technology firm, incorporated in 1973 to develop and market industrial systems using plasma arc technology. The company operates a plasma facility in the Ottawa area in which it conducts demonstrations for prospective clients and operational processing in support of commercial sales and service. The company is more than 95 per cent Canadian owned.

THE CHALLENGE

Biomedical waste represents a particular challenge for disposal since it contains infectious and toxic elements. More stringent environmental standards cannot be developed until there are technologies that can effectively meet more stringent limits. Current state-of-the-art technologies cannot meet this challenge.

Air emissions from biomedical waste incinerators are generally high in organics, acid gases and metals. Alternate technologies have problems with the complete decontamination of some elements, particularly sharps. Waste material from both incineration and alternate technologies, deposited in landfills, continues to decompose and leach, resulting in air and groundwater contamination.

Plasma technology can bridge this gap. The plasma gasification process does not produce any associated air, ground or water contamination.

TECHNOLOGY DESCRIPTION

The plasma gasification process developed by RCL for waste treatment produces a clean combustible gas and a non-toxic, inert slag, both of which have commercial value. Plasma gasification is a non-incineration thermal process which uses extremely high temperatures in an oxygen starved environment to completely decompose waste material into very simple molecules. The heat source is a plasma arc torch, a device which produces a very high temperature plasma gas, the hottest sustainable heat source available. The plasma arc centreline temperature can be as high as 50,000°C and the resulting plasma gas has a temperature profile of between 3,000°C and 8,000°C.

Plasma gasification is a generic process which can accommodate virtually any waste material, including liquids, gases and solids, in any form or combination. Moisture content is not a problem. The process provides substantially lower environmental emissions for both gaseous and slag by-products than do current state-of-the-art technologies.

TECHNOLOGY ADVANTAGES

Plasma gasification is a new generation technology which has been developed and introduced to minimize the known shortcomings experienced by other technologies. It also has a number of unique features which provide for very distinct advantages.

- A plasma gasification system is modular, requiring an extremely small space compared to other disposal technologies, with consequent advantages in its operation, maintenance and dependability. It can be installed within an existing superstructure, or largely underground, which may make it more pleasing aesthetically and more likely to be accepted by the public.
- Plasma gasification produces a combustible gas as a by-product. This gas can be used as, when and where required.
- The plasma torch is an independent heat source which allows for control of temperature, control of the rate of heat transfer and flexibility to vary the heat source according to need.

Ministry of the Environment

- ✲ The plasma gasification process is independent of the moisture content; therefore, there is no loss of destruction efficiency if the moisture content varies.
- ✲ The plasma gasification process provides for the virtual complete removal of all carbon from the waste material in marked contrast to incineration, which can leave upwards of 30 per cent of the waste material unprocessed in the ashes.
- ✲ With the plasma gasification process, there is an immense ratio of volume reduction from waste material to slag. It is up to 400:1 for boxed biomedical waste. (greater than 99.7 per cent reduction). Other technologies offer approximately 5:1 (80 per cent reduction).

RESULTS

Results from a feasibility test program confirm that the plasma gasification technology can be used in the disposal of all biomedical waste with environmental benefits, particularly regarding the toxicity of air emissions and leachate. All concentrations in air emission and slag leachate were well below the emission standards in MOE Guideline A-7 and Regulation 347. Point of impingement maximum ground level concentrations were many orders of magnitude lower than the standards in MOE Regulation 346. Bacteria survival testing confirmed that not even the most heat resistant spores can survive the process even when the population is exceptionally high or exceptionally hard to destroy. Such results indicate the potential future for plasma gasification.

The extremely low amounts of leachate of toxic elements from the slag would indicate that the continued use of landfill as a depository for biomedical waste disposal by-products is a procedure of the past.

OPPORTUNITIES

RCL has acquired international recognition during its years of experience using plasma technology to convert a number of different waste streams. In addition to biomedical waste, RCL has extensive experience processing municipal solid waste and spent potliner. RCL also has experience with biomass, oil shale, automobile fluff, lead contaminated soils, drum reconditioning sludge, restricted drugs, incinerator ashes, reject material from paper mills, material containing asbestos, fluorescent ballasts containing PCBs, waste from the explosives industry and paint sludge.

Most biomedical waste systems would be virtually the same size as, or only slightly larger than, the system RCL uses in their plasma processing facility.

The plasma gasification process is now being commercialized.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The demonstration of this technology was supported by the Ontario Ministry of the Environment.

Industrial companies located in Ontario may seek ministry/industry services which will help them:

- ✲ reduce, reuse and recycle solid waste;
- ✲ effectively clean up historic pollution and destroy hazardous contaminants;
- ✲ reduce or eliminate liquid effluent and gaseous emissions;
- ✲ use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

FOR FURTHER INFORMATION, PLEASE CONTACT:

G.W. Carter
President
A.V. Tsangaris, VP Engineering
Resorption Canada Limited
2610 Del Zotto Avenue
Gloucester, Ontario, CANADA
K1T 3V7
Tel: (613) 731-9684 or
(613) 822-1842
FAX: (613) 731-3382 or
(613) 822-1462
Internet: rclcart@istar.ca

J. Gordon Donnelly
Senior Combustion /
Incineration Engineer
Standards Development Branch
Ministry of the Environment
2 St. Clair Avenue West, 12A Floor
Toronto, Ontario CANADA
M4V 1L5
Tel: (416) 327-6436
FAX: (416) 327-9187
Internet: donnelg@gov.on.ca

George Cadete
Industry Conservation Branch
Ministry of the Environment
2 St. Clair Ave. West, 14th Floor
Toronto, Ontario CANADA
M4V 1L5
Tel: (416) 327-1258
FAX: (416) 327-1261
E-mail: cadeteg@ene.gov.on.ca

MINISTRY OF THE ENVIRONMENT SERVICES

For information on Ministry of the Environment assistance to industry, please contact the Industry Conservation Branch at (416) 327-1492, Fax (416) 327-1261.

For more project profiles and other publications, visit the ministry's website at http://www.ene.gov.on.ca

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